Site Investigation at Middlebury College Snow Bowl in Hancock, Vermont (#962089)

(Latitude 43 56.38' Longitude 072 57.48')

Site Owner
Middlebury College
Service Building
Middlebury, Vermont 05753
(802) 443-5726
Contact: Mr. Edmund Sullivan

Site Address
Route 125
Hancock, Vermont 05748
(802) 388-4356
Contact: Mr. Peter Mackey

Prepared by
Aquaterra
39 Pinnacle Drive
South Burlington, Vermont 05403
(802) 860-5016
Contact: Mr. Roland Luxenberg, P.E.

16 January 1997

Site Investigation at Middlebury College Snow Bowl in Hancock, Vermont

Executive Summary

Two underground storage tanks (one likely fuel oil, one gasoline) were removed on 12 September 1996 from an area just southwest of the maintenance shop at the Middlebury Snow Bowl, during which impacted soils above ANR guidelines were observed. Additionally, impacted soils were observed in the vicinity of an above ground storage tank (diesel) to the southeast of the maintenance shop. Soil borings with monitoring well installations were completed on 25 and 26 November 1996. Water sampling of these wells and a nearby small stream was conducted on 8 December 1996.

Soil borings showed the site to consist of medium and fine sands, with some gravel and silt, and occasionally detritus. The site represents a low lying area terminating in a small wetland area, with groundwater occurring less than two feet below grade to at grade. Ground water flow direction follows site topography, from northeast to southwest.

Water sampling found impacted ground water at seven out of eight monitoring wells. The majority of the ground water impact was in terms of total petroleum hydrocarbon content; only two wells (2 and 3, near the removed USTs) had a volatile organic compound (benzene) concentration above the Primary Ground Water Enforcement Standard. Shallow soils in the vicinity of the diesel AST were impacted, but underlying ground water was relatively lightly impacted. The nearby stream, a small year round tributary which discharges to the headwater stream of the South Branch of the Middlebury River, was not found to be impacted. TPH was found in ground water near a small wetland area.

The only likely receptors in the vicinity of the site are the small tributary or wetland area. No residences are located by the site, and the on-site public drinking water supply is a drilled well about 400 feet to the east of the USTs and AST. The existing data indicate that the magnitude of the contamination, given the possible length of time during which releases could have occurred in the vicinity of the USTs and AST, is relatively small. The likely elevated organic content of the soil and the shallow depth to ground water both contribute to a situation which would allow for adsorption of contaminants coupled with aerobic biodegradation

Recommendations for this site are to: (1) monitor polyencapsulated soils by headspace screening and subjective odor assessment every two months beginning in March or April 1997 to document when conditions for on-site thin spreading have been reached, and; (2) complete three more rounds of water sampling in April, July, and October of 1997 to document stability or decline of on-site contamination. Samples should be collected from all on-site wells and the tributary discharge and analyzed for volatile organic compound and for total petroleum hydrocarbon content.

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1.0 Site location and use

The Middlebury College Snow Bowl is located in the Town of Hancock, about one half mile east of the border with the Town of Ripton. It is situated just south of State Route 125. It is located on land owned by Middlebury College within the Green Mountain National Forest. The site is located in a small valley at an elevation of about 1840 feet above the 1929 National Geodetic Vertical Datum (NGVD), with surrounding mountains to the south, north, and east extending to 2800 to 3000 feet above the NGVD. Site drainage is to the west, and forms the headwaters of the South Branch of the Middlebury River. The Area Map (from USGS, 1983) shows the various features described above.

The site has been used for recreational skiing since the early 1930's. Major site improvements consist of three chair lifts, a main base lodge, a maintenance shop, nearby diesel powered air compressors to service a snow making system, and a now unused caretaker's cabin. The maintenance shed, where most of the underground storage tanks (USTs) and above ground storage tanks (ASTs) have been located, has been present since the late 1950's.

Site water is provided by an on-site drilled well (nearly 200 feet in depth) located south of the base lodge. Site wastewater is disposed of on-site in a septic tank and pressurized leachfield system. The leachfields (newly constructed in the autumn and winter of 1994) are located north and west of the maintenance shop. The Area Map and Site Map (from Phelps Engineering, 1994) show the above described features.

Site soils in the immediate area of the maintenance shed have been classified as Walpole silt loam by the US Department of Agriculture (USDA, 1971). These soils are described as poorly drained, loamy to a depth of 15 to 20 inches, than sandy below that depth. These soils are formed on water deposited sand and gravel derived from schistose rocks and some limestone. Snow Bowl employees indicated that fill has been brought into the area south of the maintenance shed (Middlebury College, 1996).

2.0 Abutters

Middlebury College owns large parcels of land in the vicinity of the site; there are no relevant abutting properties (Middlebury College, 1996).

tributary just upstream of the culvert underneath the roadway leading to the maintenance shop.

4.0 **Soil Borings and Monitoring Wells**

Soil borings and monitor well installation was completed by Adams Engineering of Underhill, Vermont on 25 and 26 November 1996. Boring logs and details of monitoring well construction are found in Appendix B. Borings were started by augering a 9 inch (") hole to 1 foot (') below grade (for eventual installation of a 7" flush mounted protective casing), and augering a 4" pilot hole to 2' below grade. A 2.6" outer diameter by 2.375" inner diameter by 5' length NQ steel casing with a polyethylene liner was vibrated to depth increments of 5' below grade (i.e. 5', 10', etc.). The sampler was retrieved and the liner was removed. The retained soils were measured for percent recovery, inspected for description (including texture, color, moisture, and odor), and headspace screened as appropriate.

Headspace screening was conducted by placing soil samples into "zip-lock" plastic bags, sealing the bags, then placing them in a calm, room temperature environment. After the temperatures had stabilized, the soil in the bag was mixed, the bag was opened, and the headspace was screened with a portable Hnu PID equipped with a 10.2 eV lamp and calibrated using 100 ppm isobutylene to register as ppm benzene. Elevated readings were checked by re-sealing the bag, then repeating the above procedure.

Once the desired boring depth had been reached and depth to ground water was ascertained, a 5' length of PVC well screen (Schedule 40, 0.010 micron slot) with end cap and appropriate riser was placed into the open borehole at the appropriate depth. Beach sand (from southern New Jersey) was placed under, around, and above the pipe to above the well screen to form a sand pack; natural sandy soils which may have collapsed in the open hole also represented some of the sand pack. Powdered or pellet bentonite (from Wyoming) was used to seal the sand pack and well screen from surface infiltration. For flush mount wells, the riser was cut to 0.3' below grade, and the protective casing was cemented in place.

Borings showed that the majority of soils consisted of sandy soils with silt and gravel, and some detritus. Sulfide odors were encountered at some locations, sometimes along with petroleum odors. The latter appeared to be of the "diesel" type, as opposed to a lighter "gasoline" type odor. Elevated PID readings were encountered in several borings (e.g. borings 1, 2, 3, and 8) near the water table, with deeper soils grading to background PID readings. It was also observed that shallow soils (i.e. less than two feet deep) at boring location 7 had evidence of petroleum products, but underlying soils were not impacted.

Wells were developed on the day of installation using dedicated polyethylene tubing placed near the well bottom and a peristaltic pump until the purged water ran clear. Sheen was observed on initial purged water from wells 1, 2, and 3. The horizontal

location of each well was determined by measuring distances (using cloth tape) from at least two existing landmarks. The vertical elevation of the PVC riser at each well was determined using an automatic level and graduated rod, referencing a known site defined elevation (in this case, the concrete floor of the maintenance shop, relative elevation of 108.7 feet)

5.0 **Water sampling**

Water sampling was accomplished on 4 September 1996 (two locations on the small tributary stream), on 8 December 1996 (seven wells and the small tributary discharge to the South Branch of the Middlebury River), and on 23 December 1996 (one well not sampled on 8 December 1996). Surface water samples were collected by directly filling 40 milliliter glass vials or one liter glass jars preserved with hydrochloric acid. Prior to sampling monitor wells, the depth to water was determined. Wells were sampled by first purging standing water using dedicated string and 3/4" outside diameter polyethylene bailers. Polyethylene tubing and a peristaltic pump were used to purge and sample monitor well 2 due to the loss of a bailer into this well. After the wells had recovered, the bailer (or tubing) was used to collect water to pour into the appropriate preserved container. Water temperature and specific conductance were also measured. Table 1 contains the field data for the December sampling.

Samples were submitted to ITS Environmental in Colchester, Vermont for volatile organic compound (VOC) analysis following US EPA Method 8020, and total petroleum hydrocarbon (TPH) analysis following US EPA Method 418.1 (the latter only for water sampling conducted on 8 December 1996). The Analytical Reports are found in Appendix C.

6.0 **Conclusions**

6.1 **Contamination Distribution and Transport**

No VOCs (benzene, toluene, ethylbenzene, xylenes, and methyl tertiary butyl ether, collectively referred to as BTEX and MTBE, respectively) were detected in either surface water sample ("Up" or "Down") collected on 4 September 1996. No VOCs or TPH were detected in the surface water sample collected on 8 December 1996, this sample further downstream of the above two samples.

Only well 3 contained detectable levels of each of the BTEX compounds and MTBE, with benzene found above the Primary Ground Water Enforcement Standard (PGWES). Well 3 was located closest to the previous location of the removed gasoline UST. Well 2 also contained benzene above the PGWES. However, all wells but well 5 contained detectable amounts of TPH, with the highest concentrations near the locations of the former USTs. Specific conductance did not show a strong correlation with contaminant levels. Ground water contours, total BTEX concentrations, and TPH concentrations for the December 1996 sampling are shown on an annotated Site Map figure.

The presence of low levels of toluene, with little or no other BTEX compounds (i.e. wells 4, 5, 6, 7, and 8) are believed to be the result of toluene contamination of the PVC well screen and riser. Adams Engineering learned from its pipe supplier (Timco, Inc.) that the acetone Timco used to clean the PVC pipe was contaminated with toluene. It is not uncommon to find toluene contamination in the 10 to 100 ug/l range for ground water samples obtained from wells using this contaminated PVC, and it is also likely that this contamination will decrease over time (Adams Engineering, 1997).

Important to note is that depth to ground water in the wells was at (well 8) or above (all other wells) the top of the well screen during sampling in December 1996. The depth to ground water below grade was typically one foot or lower. This shallow depth to ground water increases the likelihood of aerobic conditions in petroleum impacted subsurface areas, which in turn would increase the likelihood for biodegradation of petroleum compounds. In addition, the organic content of the soils, particularly closer to the stream and the wetland area, would help to both adsorb petroleum compounds and either provide food or substrate for biodegrading organisms. The sulfide odor observed at depth in some of the borings may be evidence of biological activity.

Ground water flow direction generally follows topography, and is from northeast to southwest. Hydraulic gradients range from 0.05 at the highest elevation areas to a more representative 0.03 at the lower lying areas. A porosity of 0.3 would be reasonable for the site's silty sands. Using a range of likely hydraulic conductivity (0.3 to 30 feet per day), possible ground water velocity (equal to the product of hydraulic conductivity and gradient divided by porosity) can range from 0.03 to 3 feet per day.

6.2 **Receptor analysis**

The most likely potential on-site receptors are the small stream (about 25 feet south of the relocated diesel AST and 100 feet south of the removed gasoline and #2 fuel oil USTs), and the wetland area about 100 feet to the southwest of the removed USTs. The small stream has not been impacted to date, as evidenced by the 4 September and 8 December 1996 sampling results. The wetlands may be impacted by heavier weight petroleum compounds, as evidenced by detectable amounts of TPH in nearby well 4. For ground water to travel the approximate 100 feet from the former USTs to the small tributary or wetland areas, the time required ranges from about 3500 days (about 9 years) to 35 days (about 1 month) based on the available information. Thus, given the possible age of the tanks (20 or more years old), it is possible that released petroleum products would have had sufficient time to reach the most likely potential receptors.

The on-site drilled well is located about 400 feet to the south, and is also likely to be hydraulically upgradient of the impacted area; there is almost no possibility that this well has been impacted from the observed petroleum impacts. The only buildings in the vicinity of the impacted area are the maintenance shed (built on a slab), and an unused caretaker's cabin (above grade wooden floor) about 100 feet to the west of the UST

locations. Any impact to the maintenance shop in the form of infiltrating soil vapor containing VOCs could be difficult to ascertain given the potential for VOCs to be present due to common activities performed in this building. No impact is expected at the caretaker's cabin, due to the distance from the site, its construction, and the fact that this cabin is unused.

7.0 **Recommendations**

Due to the relatively limited amount of ground water contamination observed, and considering the length of time over which petroleum products may have been introduced to the site, additional petroleum impacted soil removal is not recommended. Recommendations for this site are to:

(1) Monitor polyencapsulated soils by headspace screening and subjective odor assessment every two months beginning in March or April 1997 to document when conditions for on-site thin spreading have been reached.

(2) Complete three more rounds of water sampling in April, July, and October of 1997 to document stability or decline of impacted ground water, and continued absence of impact to surface water. Ground water elevations should be measured in all on-site wells. Samples should be collected from all on-site wells (immediately after purging) and the tributary discharge and analyzed for VOCs by US EPA Method 8020 and for TPH by Method 418.1. As the only potential receptors, the tributary discharge and well 4 (representative of potential impact to the wetland area) should be analyzed for VOC content by Method 8260 instead of 8020. Additionally, sample temperature and specific conductance should be measured.

8.0 **References**

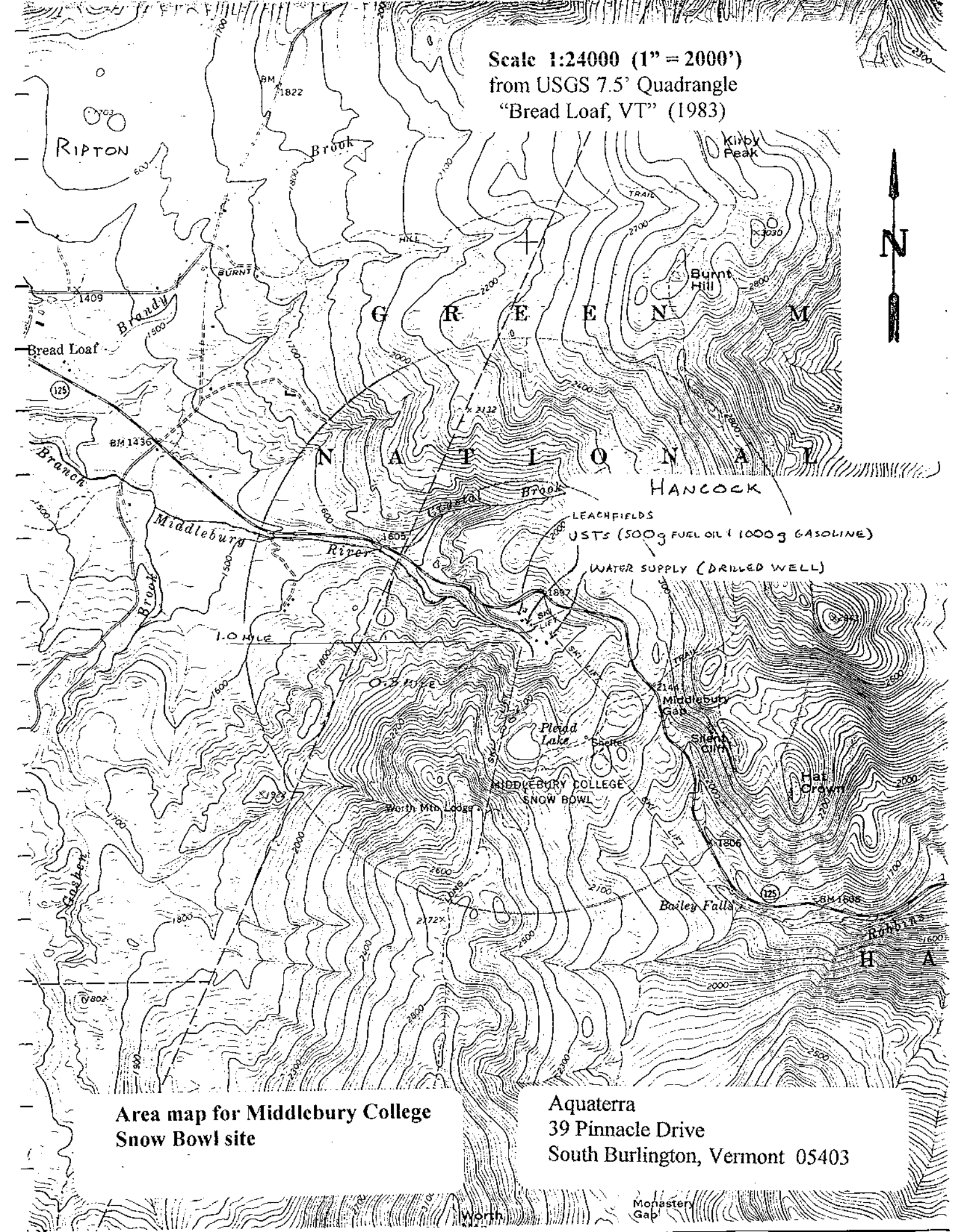
Adams Engineering. 1997. Personal communication with Mr. Gerard Adams on 6 January 1997.

Middlebury College. 1996. Personal communication with Mr. Peter Mackey and Mr. Edmund Sullivan.

Phelps Engineering. 1994. Wastewater Disposal System Renovation Project. Drawing No. 94430-1R (Site Plan) and 94430-5R (Shelter Site Plan and Details). Middlebury, Vermont.

US Department of Agriculture. 1971. Soil Survey of Addison County, Vermont. Sheet 73 and pages 42 and 43. US Government Printing Office, Washington, DC.

US Geological Survey. 1983. 7.5' Quadrangle Bread Loaf, VT.

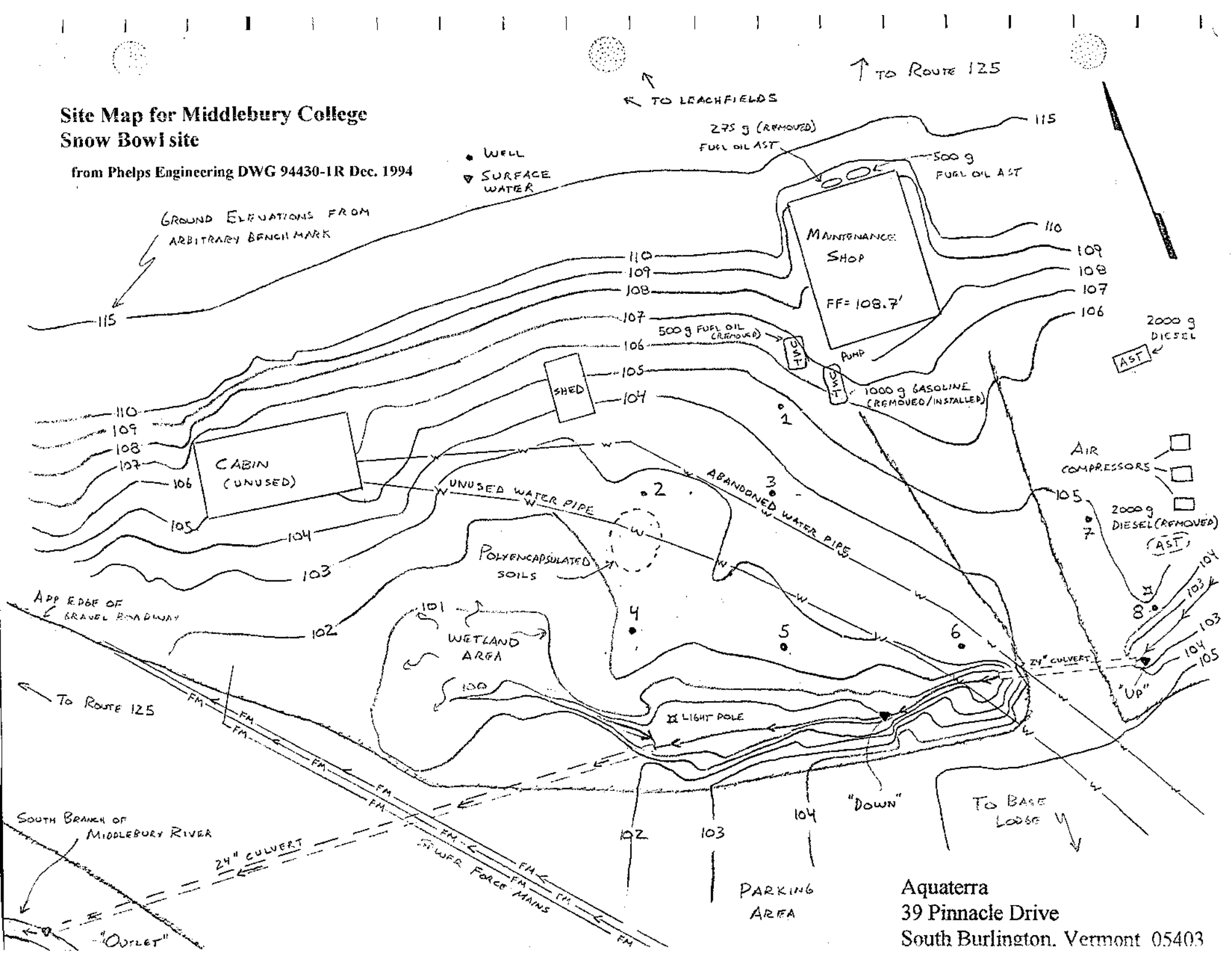


Area map for Middlebury College Snow Bowl site

Aquaterra
39 Pinnacle Drive
South Burlington, Vermont 05403

Site Map for Middlebury College Snow Bowl site

from Phelps Engineering DWG 94430-1R Dec. 1994



Aquaterra
39 Pinnacle Drive
South Burlington, Vermont 05403

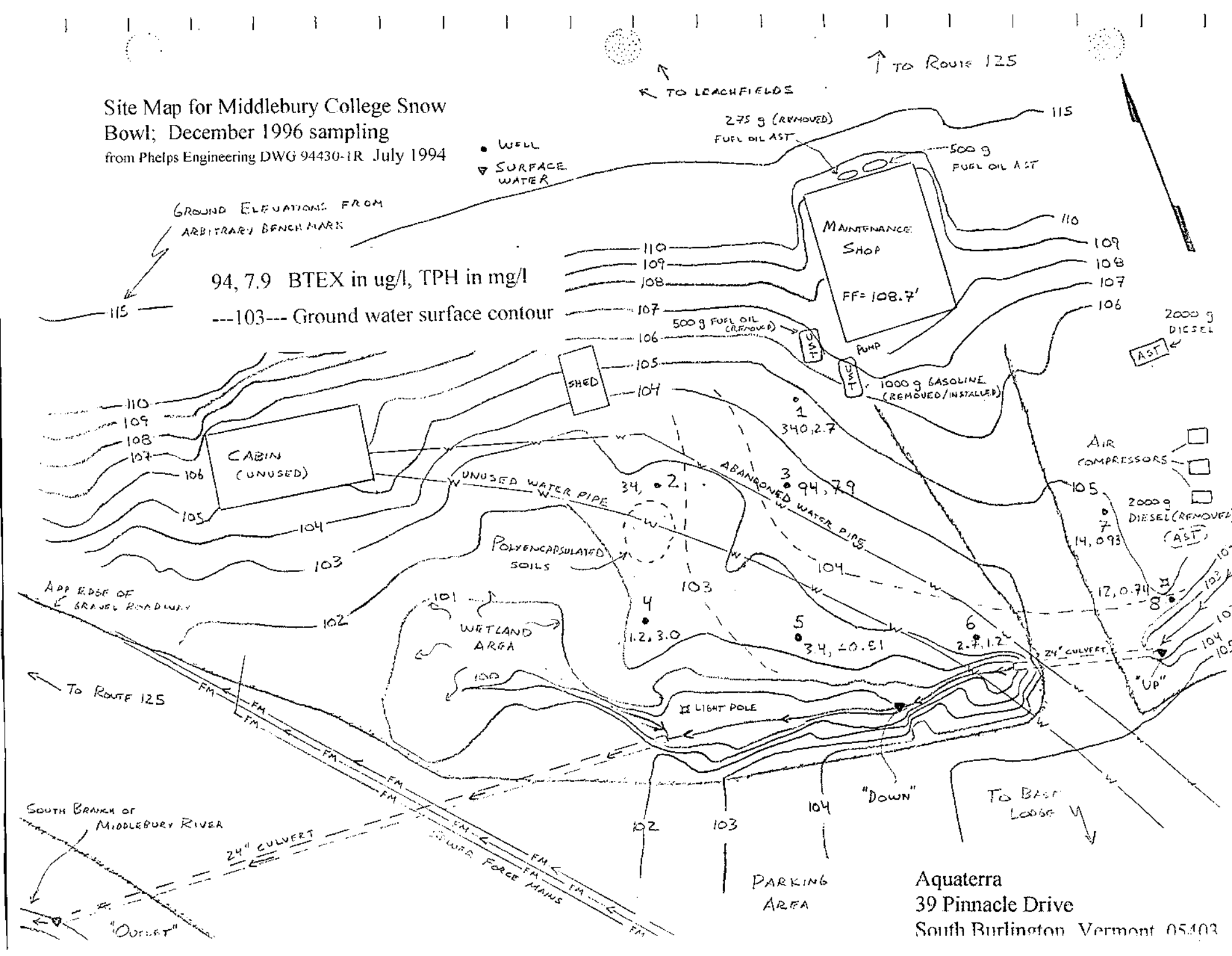

Site Map for Middlebury College Snow Bowl; December 1996 sampling
from Phelps Engineering DWG 94430-1R July 1994
• WELL
▽ SURFACE WATER
GROUND ELEVATIONS FROM ARBITRARY BENCHMARK
94, 7.9 BTEX in ug/l, TPH in mg/l
---103--- Ground water surface contour
TO LEACHFIELDS
TO ROUTE 125
275 g (REMOVED) FUEL OIL AST
500 g FUEL OIL AST
MAINTENANCE SHOP
FF= 108.7'
500 g FUEL OIL (REMOVED)
UST
PUMP
1000 g GASOLINE (REMOVED/INSTALLED)
2000 g DIESEL
AST
SHED
CABIN (UNUSED)
UNUSED WATER PIPE
ABANDONED WATER PIPE
AIR COMPRESSORS
2000 g DIESEL (REMOVED)
POLYENCAPSULATED SOILS
APP EDGE OF GRAVEL ROADWAY
WETLAND AREA
LIGHT POLE
24" CULVERT
"UP"
"DOWN"
TO ROUTE 125
FM
SEWER FORCE MAINS
SOUTH BRANCH OF MIDDLEBURY RIVER
"OUTLET"
TO BASE LODGE
PARKING AREA
Aquaterra
39 Pinnacle Drive
South Burlington, Vermont 05403

Table 1 **Field and analytical data for water sampling at Middlebury College Snow Bowl.**

8 December 1996 *

Samp ID	Depth to surf. feet	Surf. elev. feet	Purge vol. liter	Temp. deg C	Spec. cond. uS	Volatile Organic Compounds by 8020					Total pet. hydro. mg/l
						Benzene ug/l	Total Xylenes ug/l	Ethyl benzene ug/l	Toluene ug/l	MTBE ug/l	
Wells											
1	1.00	103.92	2.1	4.2	190	<5	6.2	<5	330	<0.5	2.7
2	2.21	101.56	4.0	2.6	340	**7.0**	0.63	<0.5	28	7.5	
3	0.00	103.36	3.7	3.4	380	**9.4**	77	5.9	1.7	7.0	7.9
4	2.83	101.42	0.8	3.5	165	<0.5	<0.5	<0.5	1.2	0.7	3.0
5	0.42	102.53	2.3	2.8	550	<0.5	1.1	<0.5	2.3	0.7	<0.51
6	0.46	102.84	2.0	3.9	155	<0.5	<0.5	<0.5	2.7	<0.5	1.2
7	0.54	103.95	3.4	3.4	180	<0.5	<0.5	<0.5	14	<0.5	0.93
8	1.56	102.99	1.7	3.8	165	<0.5	<0.5	<0.5	12	<0.5	0.74
Standard						5	400	680	2420	40	none
Surface water											
Outlet	na		na	2.1		<0.5	<0.5	<0.5	<0.5	<0.5	<0.42

Notes: * Well 2 sampled on 23 December 1996
Surf. = Water surface, elev. = elevation, vol. = volume, Temp. = Temperature
Spec. cond. = Specific conductance, MTBE = Methyl tertiary butyl ether, ND = not detected
Tot. pet. hydro. = Total petroleum hydrocarbons by 418.1

Inchcape Testing Services
Environmental Laboratories

55 South Park Drive
Colchester, VT 05446
Tel. 802-655-1203
Fax. 802-655-1248

September 12, 1996

Mr. Edmund Sullivan
Service Building
Middlebury College
Middlebury, Vermont 05753

Re: Tank Closure Form and Site Assessment for Snow Bowl site;
ITS Project No. 96064

Dear Mr. Sullivan:

Attached is the Underground Storage Tank Permanent Closure Form for the closure of two underground storage tanks (USTs) at Middlebury College's Snow Bowl facility in Hancock, Vermont. The tank closure occurred on 9 September 1996, with tank removal and tank disposal by All Seasons Excavating of Colchester, Vermont; tank pump-out, liquid waste disposal, tank cleaning, tank bottoms disposal, and rendering tanks unusable by Environmental Products and Services of Burlington, Vermont, and site assessment services by Inchcape Testing Services (ITS) of Colchester, Vermont. The following is the site assessment for the tank closure; eight (8) color photographs documenting site conditions are also attached.

General Site Information

The USTs were located just south and west of the maintenance shed at the Snow Bowl facility This facility is Middlebury College's alpine ski area, in full use from December until April (weather permitting), with on-going maintenance during the remainder of the year. Tank 1 was a 1000 gallon single walled steel UST used for gasoline storage; this tank is believed to be over 20 years in age. After water was observed in a fuel tank which had received fuel from this tank during June 1996, no additional fuel was dispensed from this tank. Tank 2 was a 550 gallon single walled steel UST used for #2 fuel oil storage. This tank is believed to be over 20 years in age, and had not been used for sometime. An unused 275 gallon single walled steel aboveground storage tank (AST) previously used for #2 fuel oil storage was located just behind (east) of the shed; the age and date of last use of this tank is unknown. An in-service, 500 gallon single walled steel AST used for #2 fuel oil storage is also located behind the maintenance shed; the age of this tank is unknown. A 2000 gallon steel AST used for diesel fuel storage installed in 1990 is located approximately 75 feet to the south of the maintenance shed.

The area around the USTs is used for vehicle maintenance, vehicle parking, and the operation of three diesel fueled air compressors for snowmaking operations. The maintenance shed is a steel building on a concrete slab. Upgradient of the site is a force main fed leachfield installed in late 1994, and then Route 125. Downgradient of the USTs

is a small, unnamed, year round stream, which in turn empties into a tributary of the South Fork of the Middlebury River. Past the small stream is a parking lot for the ski area, and past the parking lot is the main ski lodge and ski lifts. A 1000 gallon UST for #2 fuel oil storage (not 2000 gallon as noted in the Notice of Alleged Violation issued by the ANR dated 14 August 1996) was installed immediately adjacent to the ski lodge in late 1994; please see the attached Middlebury College requisition which refers to this tank.

Site Characteristics and Contamination Investigation

Soils observed during the excavation consisted of predominantly medium and coarse sand with gravel, with some finer sands towards the bottom of the excavation. Some detritus (tree roots) and miscellaneous debris was observed in the upper soil layer. On-site personnel indicated that fill had been brought into this area.

An Hnu PID calibrated with isobutylene to register readings as benzene was used to assess excavated and in-situ soils. Tank 2 (550 gallon for #2 fuel oil) was excavated first after about 450 gallons of product was removed from the tank. Soils down to about 3 feet below grade (2 feet below the tank top) were not impacted. Soils below this level were impacted around the entire excavation, with PID readings of 30 to 40 ppm, and some distinct staining at about 4 feet below grade registering PID readings of 100 ppm. Soils contamination diminished with depth at the upgradient area of the tank, where a denser, finer sand layer was observed at 5 feet below grade. Soil contamination about 1 foot below the tank bottom downgradient of the tank showed contamination of 35 to 50 ppm. The excavation was extended another 5 feet in the downslope (downgradient) direction, with similar contamination observed. During the tank removal, some standing water was observed under the tank bottom, and after excavation had ceased, standing water was observed at a depth of about 5 feet. Some sheen was observed on the water surface. The tank was found to have small holes at both its upgradient and downgradient end, mostly along its eastern (nearest to maintenance shed) side.

Tank 1 was then excavated after about 300 gallons of product was pumped from the tank. Soils down to about 4 feet below grade (2 feet below the tank top) were not impacted. Stained soil about 5 feet below grade had PID readings of 65 to 120 ppm; soils below this stained region ranged from about 10 to less than 0.5 ppm. Standing water was also observed in this hole after excavation activities had ceased, with a slight sheen on the water surface. No obvious holes were observed in the tank, but the piping to the tank was in relatively poor condition and may have allowed for water to enter the tank. Based on the extent of contamination and likely impact to ground water, the excavated material was placed back into both holes, backfilling with dirtier soils first.

About 100 gallons of fuel oil was pumped from the 275 gallon AST. All three tanks were inerted by forced ventilation, rendered useless by cutting open, cleaned, and taken off-site for disposal as scrap steel. A total of 850 gallons of waste product and water were transported off-site in a vacuum truck for energy recovery and water treatment. One 55

gallon drum of tank bottom sludge, cleaning materials, and personnel protective equipment was transported off-site for disposal via incineration.

On 4 September 1996, during a preliminary assessment of the site prior to the tank removal, an effort was made to obtain ground water and soil samples in the vicinity of the diesel AST. Shallow soils (less than 1 foot below grade) in the immediate vicinity of the dispensing nozzle registered PID readings of 120 ppm. Ground water was encountered about 3 feet below grade, but efforts to obtain a sample using a slotted probe and vacuum were unsuccessful. The moist, fine sandy soil which clogged the slotted probe and prevented sample collection had an obvious petroleum odor. Two water samples from the adjacent stream (discussed further below), one sample about 15 feet from the AST and another sample from a point along the stream's northern bank about 60 feet further downstream, were collected for 8020 analysis; results are pending.

Receptor analysis

Soils have been impacted from the USTs and AST. Underlying ground water in the vicinity of the AST has been impacted. Based on the standing water observed in the tank excavations, and the sheen on the water surface, it is very likely that underlying ground water in the vicinity of the USTs has been impacted. A small, unnamed, year round stream is located about 15 feet downgradient from the AST and about 75 feet downgradient from the UST's. This stream has obvious iron staining, and also had a multi-colored sheen along its northern bank, although this sheen could be biological in nature. Due to either the likely long duration of leaking product from the USTs, or the proximity of the AST, it is possible that this stream has been impacted. About 90 feet in the downstream direction, the stream is adjoined by a small wetland area. At this point, the stream enters a culvert, passes 170 feet to the southeast underneath the main ski area parking lot, and empties into the main drainage from the ski area, a small tributary to the South Fork of the Middlebury River.

A drilled well (well over one hundred, but less than 200 feet in depth, and artesian in nature), is located about 400 feet east of the USTs and AST. This well provides potable water to the on-site buildings, including a cafeteria in the main ski lodge. As already mentioned, the nearest building to the AST and USTs is a maintenance building on a concrete slab. A caretakers building, unused during the past two years, is located about 130 feet to the west of the USTs.

Conclusion and recommendations

Soils and ground water have been impacted by release of petroleum products from USTs and an AST at the Snow Bowl facility. The release from the fuel oil UST was likely due to holes in the UST. The release from the gasoline UST is not obvious, and observed contamination in the tank excavation could be related to the fuel oil UST. The release from the diesel AST is most likely due to a number of small releases during vehicle and compressor fueling. It is possible that a small year round stream downgradient of the

release sites has been impacted. It is unlikely that any human health impacts have been or will be experienced at this site, due to the low probability of: (1) exposure to contaminated vapors; (2) contamination of deeper ground water used for on-site potable water); and (3) contact with contaminated soil.

The chief recommendation at this time is to conduct a monitoring well installation program in the vicinity of both the removed USTs and existing diesel AST to : (1) confirm the presence or absence of free product; (2) define the horizontal and vertical extent of contamination; and (3) determine the likelihood that the small stream may be impacted, if stream samples collected on 4 September do not indicate an existing impact.

All of this information has been sent to Mr. Tim McNamara at the Waste Management Division of the ANR. Please contact me if you have any questions concerning this information.

Sincerely,

Roland R. Luxenberg, P.E.

RRL/din

cc: Mr. Tim McNamara (Agency of Natural Resources, Waste Management Division)

AGENCY USE ONLY
Sched. closure date: 11/11/96
Facility Town:
Facility ID#:
DEC Official:
Evaluated by:

VERMONT AGENCY OF NATURAL RESOURCES
DEPT. OF ENVIRONMENTAL CONSERVATION
HAZARDOUS MATERIALS MANAGEMENT DIV.
103 SOUTH MAIN STREET, WEST BUILDING
WATERBURY, VERMONT 05671-0404
TELEPHONE: (802) 241-3888

Company conducting site assessment: RJ Incidade Testing
Person conducting site assessment: Roland Luxenberg
Telephone number of company (or person): 802 655 1203
Date of UST closure: 9 SEP 96
Date of site assessment: 11 SEP 96

This Closure Form may only be used for the facility and date indicated in the upper left hand corner. Changes in the scheduled closure date should be phoned in at least 48 hours in advance. Both the yellow and white copies must be returned to the above address; the pink copy should be retained by the UST owner. A written report from an environmental consultant covering all aspects of closure and site assessment, complete with photographs and any other relevant data, must accompany this form. All procedures must be conducted by qualified personnel - including training required by 29 CFR 1910.120. Documentation of all methods and materials used must be adequate. All work must be performed in compliance with DEC policy "UST Closure and Site Assessment Requirements" as well as all applicable statutes, regulations, and additional policies. The DEC may reject inadequate closure forms and reports.

Section A. Facility Information:
Name of Facility: [illegible] Number of Employees: 4-10 FULL TIME
Street address of facility: Route 125 Hancock, VT
Owner of UST(s) to be closed: Middlebury College
Name of Contact and telephone number if different from owner: Edmund Sullivan
Mailing address of owner: Service Building Middlebury Vermont 05753
Telephone number of owner: (802) 443 5726

Section B. UST Closure Information: (please check one)
Reason for initiating UST Closure: ___Suspected Leak ___Liability ___Replacement ✓Abandoned
Which portion of UST is being closed: ___Tanks ___Piping ✓Tanks & Piping
USTs undergoing permanent closure. Include condition and if leaks were found:

UST#	Product	Size (gallons)	Tank age	Tank condition	Piping age	Piping condition
1	GASOLINE	1000	>20	GOOD	>20	FAIR
2	FUEL OIL	550	>20	POOR	>20	FAIR

Which tanks, if any, will be closed in-place (must have approval from DEC)
Disposal/destruction of removed UST(s):
Location Disposal on site Disposal Mound, VT Date 9/9/96 Method Cut open Date 9/9/96

Amount (gal.) and type of waste generated from USTs: ~300 g GASOLINE, ~550 g FUEL OIL ~1/4 gal sludge/bottom liq
Tank cleaning company (must be trained in confined space entry): Environmental Products and Services
Certified hazardous waste hauler (tank contents are hazardous waste unless recovered and usable product): Environmental Products and Servic
Hazardous waste generator ID number: VTP000007259

USTs not closed. This portion must be filled in to include all USTs, regardless of size, and status, *whether "abandoned", "in use", "to be installed", or "not aware of any other tanks on-site". Remember: most new installations require permits and advance notice to this office.

UST#	Product	Size (gallons)	Tank age	*Tank Status	Piping Age	*Piping Status
3	#2 FUEL OIL	1000	2	IN USE	2	IN USE

PID Calibration information: Date 7/9/96 Time 0600 Type of Gas ISOBUTYLENE
Contamination detected with PID (ppm): Peak 120 Depth of peak (ft) 5 Avg 40
Soil samples collected for laboratory analysis? Yes _____ # of samples _____ No ✓
(show locations and depth of all readings and samples on diagram).

Have soils been polyencapsulated on site? Yes____ list amount (cu. yds.):_____ No ✓
Have any soils been transported off site? Yes____ list amount (cu. yds.):_____ No ✓
Location transported to:_____
Name of DEC official granting approval to transport soils:_____ Date: 1/1
Amount of soils backfilled. (cu. yds.): ~~45~~ 35, Avg.PID 40
Have limits of contamination been defined? Yes____ No ✓
Are you aware of any other contaminants which may be present? Yes ____ No ✓
Comments:_____

Free phase product encountered? Yes____ thickness_____ No ✓
Groundwater encountered? Yes ✓ depth(ft) 5-6 No____

Were there existing monitoring wells on site? Yes____ (# samples taken___) No ✓
Have new monitoring wells been installed? Yes____ (# samples taken___) No ✓
Samples collected from monitoring wells for lab analysis? Yes____ No ✓
(include well location, headspace readings, and laboratory results if applicable in a seperate report and on the site diagram)
Is there a water supply well or spring on site? Yes ✓ (check type: shallow____ rock ✓ spring____) No____
How many public water supply wells are located within a 0.5 mile radius? 1 min. distance (ft): 400
How many private water supply wells are located within a 0.5 mile radius? 0 min. distance (ft):_____
What receptors have been impacted? ✓soil ___indoor air ✓groundwater ___surface water ___water supply

Section D. Statements of UST closure compliance: (must have both signatures or site assessment not complete)
As the party responsible for compliance with the Vermont UST Regulations and related statutes at this facility, I hereby certify that all of the information provided on this form is true and correct to the best of my knowledge.

Edmund Sullivan
Signature of UST owner or owner's authorized representative

Date: 12 SEPTEMBER 1996

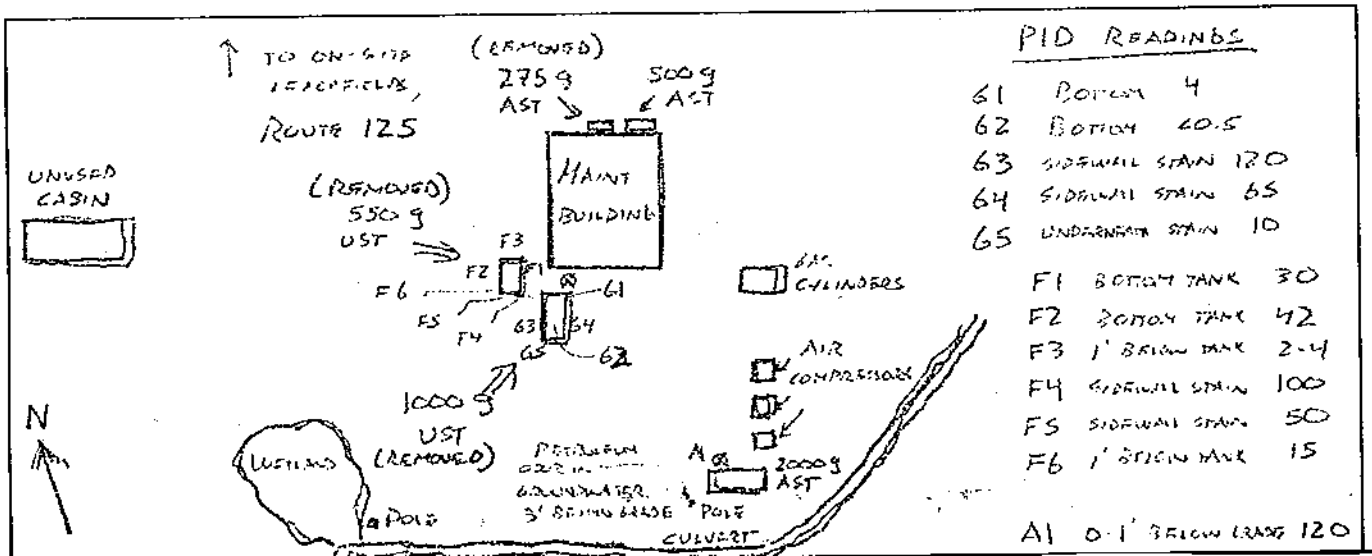
As the environmental consultant on site, I hereby certify that the site assessment requirements were performed in accordance with DEC policy and regulations, and that information which I have provided on this form is true and correct to the best of my knowledge.

Roland Turpenberg
Signature of Environmental Consultant

Date: 12 SEPTEMBER 1996

SITE DIAGRAM

Show location of all tanks and distance to permanent structures, sample points, areas of contamination, potential receptors and any pertinent site information. Indicate North arrow and major street names or route number.



Photograph 7 Excavated 1000 g gasoline UST (bottom = north); note soil staining, with non-stained soil beneath stained layer, and standing water along bottom of excavation.

Photograph 8 Final site conditions (left = west). Excavated soils placed back in excavations

3.0 **Petroleum Products and Hazardous Substances activities**

There are no other commercial activities within one mile of the site. Site activities involve the use of diesel fuel to power air compressors and some vehicles, #2 fuel for on-site heating of the base lodge and maintenance shop, and gasoline for vehicle fueling. There is also typical minor use of substances associated with vehicle maintenance activities (e.g. lubricating oils, grease).

3.1 **Storage tanks**

Underground storage tanks (UST) have been used for **gasoline** storage (1000 gallon UST just southeast of the maintenance shop, just removed and just installed), and **#2 fuel oil** storage (1000 gallon UST just north of the base lodge installed in 1994 and likely in the abandoned 550 gallon UST just removed from just west of the maintenance shop). The USTs by the maintenance shed are believed to twenty (20) or more years old. The #2 fuel oil UST at the base lodge replaced a UST at this location. Above ground storage tanks (AST) have been used for **diesel fuel** (2000 gallon AST previously just south of the air compressors, now just north of the air compressors) and **#2 fuel oil** (500 gallon AST just north of the maintenance shed and 275 gallon AST recently removed from just north of the maintenance shed). The 2000 gallon diesel AST was installed in 1984, along with the air compressors, with the beginning of snowmaking at this site. It is also believed that an AST for diesel storage was present in an area between the maintenance shop and the shed to the west of the shop (Middlebury College, 1996).

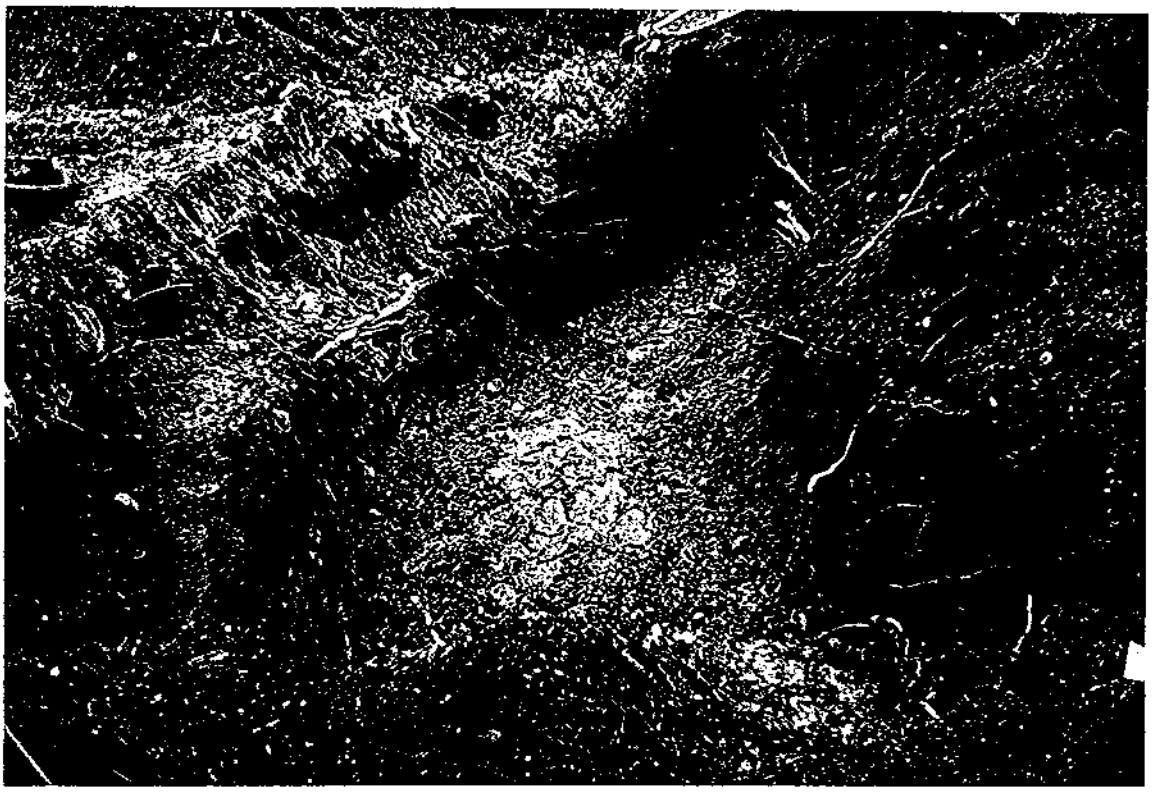
The UST and #2 fuel AST removal in the vicinity of the maintenance shop occurred on 4 September 1996; Appendix A contains the Tank Closure forms and site assessment. As mentioned in the site assessment, it is likely that the majority of soil and ground water contamination observed in the two UST excavations was due to holes in the old #2 fuel oil UST. It is likely that soil and ground water contamination observed near the diesel AST (old location) was due to a number of smaller releases during vehicle and air compressor refueling.

Since the tank removals, a new 1000 gallon UST for gasoline storage was installed in November 1996 in the prior location of the old 1000 gallon UST used for gasoline storage. The previously excavated and backfilled soils were re-excavated and polyencapsulated nearby at the location indicated on the Site Map. Three samples from the polyencapsulated soils were sampled on 26 November 1996; all had headspace screening PID readings of 2 to 2.5 ppm as benzene.

The AST was relocated in November 1996 to a new location just north of the air compressors. The AST was placed into a secondary containment vault. The air compressors are now configured to be fed fuel directly from the tank, as opposed to previously required manual filling. The air compressors are now located on a concrete pad, which slopes to a centralized oil/water separator manhole, as opposed to previously located on a gravel base. Excess water from this separator will discharge into the small

Photograph 5 Excavated 1000 g gasoline UST, looking at bottom (left = north). Note rust, but no obvious holes observed in tank walls.

Photograph 6 Excavation of 1000 g gasoline UST (left = north); note slump (due to wet soils) at northeast corner exposing unstained soil.



Photograph 3 Excavation for 550 g #2 fuel oil UST (bottom = north); note staining at mid-depth; excavation extended to south, with contamination continuing.

Photograph 4 1000 g gasoline UST prior to excavation (right = north); note rusty condition of vent piping (disconnected).

Photograph 1 Initial site conditions; blue pipes and tall vent to 1000 g gasoline UST, other pipes to 550 g #2 fuel oil UST

Photograph 2 550 g #2 fuel oil tank (right = north); small holes observed at mid depth along eastern side of tank; note water at bottom

Boring / Monitoring Well Log

Boring ID: 1

Location: just SW of tank excavation
Rationale: source area

Project site: **Middlebury Snow Bowl**
Town: Hancock, Vermont

Boring Co.: Adams Engineering
Operator(s): Gerard Adams

Super. Co.: Aquaterra
Supervisor: Roland Luxenberg, P.E.

Date, time: 25 November 1996, 1100

Groundwater: 4 feet below grade

Depth, feet	Blows per 6" on sampler	Sample Type	Sample Rec.	Description	Moist.	Odor	PID, ppm
2 - 5	NA	tube	100%	Brown medium sand, some gravel and silt *	wet @ 4'	diesel	16 @ 5'
5 - 10	NA	tube	100%	Brown medium to fine sand with gravel and silt, 5-6' Brown medium to fine sand with silt, 6-10' * Sheen on water purged from well			1 @ 10'

Boring information

Augers: not applicable
Sampler: 2.6" OD, 2.375" ID, 5' NQ
Hammer not applicable
Weight: not applicable
Fall: not applicable

Well construction

Screen: 1.5" PVC, .01" slot; 8.0-3.0'
Riser: 1.5" Sch 40 PVC; 3.0-0.3'
Sand: NJ beach, 8.0-2.0'
Bentonite: 2.0-1.0'
Prot casing: 7" flush mount, cemented
Monitoring Well ID: 1

Boring / Monitoring Well Log

Boring ID: 2

Location: SW of tank excavation
Rationale: downgradient well, impacted?

Project site: **Middlebury Snow Bowl**
Town: Hancock, Vermont

Boring Co.: Adams Engineering
Operator(s): Gerard Adams

Super. Co.: Aquaterra
Supervisor: Roland Luxenberg, P.E.

Date, time: 25 November 1996, 1300

Groundwater: 0.2 feet below grade

Depth, feet	Blows per 6" on sampler	Sample Type	Sample Rec.	Description	Moist.	Odor	PID, ppm
2 - 5	NA	tube	92%	Black fine sand with silt, gravel, and detritus, 2-3.5'	wet	diesel or sulfide	9 @ 3'
				Brown medium sand with coarse sand and gravel, 3.5-5'	wet	diesel or sulfide	<0.5 @ 5'

Boring information

Augers: not applicable
Sampler: 2.6" OD, 2.375" ID, 5' NQ
Hammer not applicable
Weight: not applicable
Fall: not applicable

Well construction

Screen: 1.5" PVC, .01" slot; 4.7-1.0'
Riser: 2.0" Sch 40 PVC; 1.0' +
Sand: NJ beach, 4.7-0.5'
Bentonite: 0.5-0.0' (pellets)
Prot casing:

Monitoring Well ID: 2

Boring / Monitoring Well Log

Boring ID: 3

Location: south of USTs
Rationale: downgradient well

Project site: **Middlebury Snow Bowl**
Town: Hancock, Vermont

Boring Co.: Adams Engineering
Operator(s): Gerard Adams

Super. Co.: Aquaterra
Supervisor: Roland Luxenberg, P.E.

Date, time: 26 November 1996, 1030

Groundwater: 0.2 feet below grade

Depth, feet	Blows per 6" on sampler	Sample Type	Sample Rec.	Description	Moist.	Odor	PID, ppm
2 - 5	NA	tube	17%	Fine sand with gravel and silt, sheen on water from hole	wet		35
5 - 10	NA	tube	100%	Grey medium to fine sand, some gravel and silt, 5-7.5' Brown very fine sand, some gravel and silt, 7.5-10'	wet		13 @ 5.5' 0.5 @ 7' 0.5 @ 8' 0.5 @ 10'

Boring information

Augers: not applicable
Sampler: 2.6" OD, 2.375" ID, 5' NQ
Hammer not applicable
Weight: not applicable
Fall: not applicable

Well construction

Screen: 1.5" PVC, .01" slot; 6.5-1.5'
Riser: 1.5" Sch 40 PVC; 1.5-0.3'
Sand: nat, 10-6'; NJ beach, 6-1.2'
Bentonite: 1.2-1.0'
Prot casing: 7" flush mount, cemented
Monitoring Well ID: 3

Boring / Monitoring Well Log

Boring ID: 4

Location: SW of tank excavation
Rationale: downgradient well

Project site: **Middlebury Snow Bowl**
Town: Hancock, Vermont

Boring Co.: Adams Engineering
Operator(s): Gerard Adams

Super. Co.: Aquaterra
Supervisor: Roland Luxenberg, P.E.

Date, time: 26 November 1996, 1130

Groundwater: at grade

Depth, feet	Blows per 6" on sampler	Sample Type	Sample Rec.	Description	Moist.	Odor	PID, ppm
0 - 3	NA	4" hand auger	NA	Sand with gravel and detritus	wet		

Boring information

Augers: 4" hand auger
Sampler: using auger
Hammer not applicable
Weight: not applicable
Fall: not applicable

Well construction

Screen: 1.5" PVC, .01" slot; 3.0-1.0'
Riser: 2.0" Sch 40 PVC; 1.0' +
Sand: NJ beach, 3-0.2'
Bentonite: 0.2-0.0' (pellets)
Prot casing:

Monitoring Well ID: 4

Boring / Monitoring Well Log

Boring ID: 5

Location: just north of small stream
Rationale: downgradient well, receptor

Project site: **Middlebury Snow Bowl**
Town: Hancock, Vermont

Boring Co.: Adams Engineering
Operator(s): Gerard Adams

Super. Co.: Aquaterra
Supervisor: Roland Luxenberg, P.E.

Date, time: 25 November 1996, 0900

Groundwater: 1.8 feet below grade

Depth, feet	Blows per 6" on sampler	Sample Type	Sample Rec.	Description	Moist.	Odor	PID, ppm
2 - 5	NA	tube	83%	Brown fine sand, some gravel	wet	sulfide @ 3-4'	<0.5
5 - 10	NA	tube	100%	Brown very fine sand, some silt and gravel	wet		<0.5

Boring information

Augers: not applicable
Sampler: 2.6" OD, 2.375" ID, 5' NQ
Hammer not applicable
Weight: not applicable
Fall: not applicable

Well construction

Screen: 1.5" PVC, .01" slot; 6.5-1.5'
Riser: 1.5" Sch 40 PVC; 1.5-0.3'
Sand: nat., 10-3.0'; beach, 3.0-1.0'
Bentonite: 1.2-1.0'
Prot casing: 7" flush mount, cemented
Monitoring Well ID: 5

Boring / Monitoring Well Log

Boring ID: 6

Location: W of air comp.s and AST
Rationale: downgradient well, receptor

Project site: **Middlebury Snow Bowl**
Town: Hancock, Vermont

Boring Co.: Adams Engineering
Operator(s): Gerard Adams

Super. Co.: Aquaterra
Supervisor: Roland Luxenberg, P.E.

Date, time: 26 November 1996, 1330

Groundwater: 1.7 feet below grade

Depth, feet	Blows per 6" on sampler	Sample Type	Sample Rec.	Description	Moist.	Odor	PID, ppm
2 - 5	NA	tube	33%	Medium sand with gravel, 4'	wet		<0.5
				Fine sand with gravel, 5'	wet		
5 - 10	NA	tube	100%	Medium and fine sand with coarse sand and gravel, 5-7'	wet		<0.5
				same as above, with iron staining, 7-8.5'	wet		
				Very fine sand	wet		

Boring information

Augers: not applicable
Sampler: 2.6" OD, 2.375" ID, 5' NQ
Hammer not applicable
Weight: not applicable
Fall: not applicable

Well construction

Screen: 1.5" PVC, .01" slot; 6.5-1.5'
Riser: 1.5" Sch 40 PVC; 1.5-0.3'
Sand: nat, 10-6'; NJ beach, 6-1.2'
Bentonite: 1.2-1.0'
Prot casing: 7" flush mount, cemented
Monitoring Well ID: 6

Boring / Monitoring Well Log

Boring ID: 7

Location: just W of air compressors
Rationale: downgradient well

Project site: **Middlebury Snow Bowl**
Town: Hancock, Vermont

Boring Co.: Adams Engineering
Operator(s): Gerard Adams

Super. Co.: Aquaterra
Supervisor: Roland Luxenberg, P.E.

Date, time: 25 November 1996, 1530

Groundwater: 2.2 feet below grade

Depth, feet	Blows per 6" on sampler	Sample Type	Sample Rec.	Description	Moist.	Odor	PID, ppm
0 - 2	NA	auger	NA	Crushed limestone and sand		diesel	
2 - 5	NA	tube	83%	Medium sand, 2-4'	wet		<0.5 @ 2-4'
				Silt and detritus, 4-4.5'	wet	sulfide	<0.5
				Coarse sand and gravel, 4.5-5'	wet		
5 - 10	NA	tube	100%	Medium and coarse sand with gravel, 5-6'	wet		<0.5
				Very fine sand, 6-10'	wet		

Boring information

Augers: not applicable
Sampler: 2.6" OD, 2.375" ID, 5' NQ
Hammer not applicable
Weight: not applicable
Fall: not applicable

Well construction

Screen: 1.5" PVC, .01" slot; 6.5-1.5'
Riser: 1.5" Sch 40 PVC; 1.5-0.3'
Sand: nat, 10-6'; NJ beach, 6-1.2'
Bentonite: 1.2-1.0'
Prot casing: 7" flush mount, cemented
Monitoring Well ID: 7

Boring / Monitoring Well Log

Boring ID: 8

Location: just SW of former diesel AST
Rationale: downgradient well, receptor

Project site: **Middlebury Snow Bowl**
Town: Hancock, Vermont

Boring Co.: Adams Engineering
Operator(s): Gerard Adams

Super. Co.: Aquaterra
Supervisor: Roland Luxenberg, P.E.

Date, time: 25 November 1996, 1430

Groundwater: 2.5 feet below grade

Depth, feet	Blows per 6" on sampler	Sample Type	Sample Rec.	Description	Moist.	Odor	PID, ppm
2 - 5	NA	tube	75%	Dark medium to fine sand with silt and detritus, 2-4'	wet	sulfide	2 @ 2-4'
				Brown medium sand grading to coarse, some gravel, 4-5'	wet	diesel or sulfide	13 @ 5'
5 - 10	NA	tube	34%	Medium sand and gravel, 5-10'	wet		8 @ 5-10'

Boring information

Augers: not applicable
Sampler: 2.6" OD, 2.375" ID, 5' NQ
Hammer not applicable
Weight: not applicable
Fall: not applicable

Well construction

Screen: 1.5" PVC, .01" slot; 6.5-1.5'
Riser: 1.5" Sch 40 PVC; 1.5-0.3'
Sand: NJ beach, 6.5-1.2'
Bentonite: 1.2-1.0'
Prot casing: 7" flush mount, cemented
Monitoring Well ID: 8

ITS Environmental
Laboratories

55 South Park Drive
Colchester, VT 05446

Analytical Report

Aquaterra
39 Pinnacle Drive
So. Burlington, VT 05403

Attention : Roland Luxenberg

Date : 01/08/97
ETR Number : 63227
Project No.: 96000
No. Samples: 1
Arrived : 12/24/96

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater.
All results are in mg/l unless otherwise noted.

Lab No./ Method No.	Sample Description/ Parameter	Result
322658	2:12/23/96 @1520(Water)	
8020	Aromatic Volatiles	C

Comments/Notes

C = Procedure/analysis completed

< Last Page > Submitted By : Karen R Clifford Aquatec Inc.

FORM 1
8020-VOA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

2

Lab Name: INCHCAPE ENVIRONMENTAL Contract: 96000

Lab Code: INCHVT Case No.: 96000 SAS No.: SDG No.: 63227

Matrix: (soil/water) WATER Lab Sample ID: 322658

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: 27DEC962132-I061

Level: (low/med) LOW Date Received: 12/24/96

% Moisture: not dec. _____ Date Analyzed: 12/29/96

GC Column: DB-VRX ID: 0.45 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1634-04-4	Methyl tert-Butyl Ether	7.5	
71-43-2	Benzene	7.0	
108-88-3	Toluene	28	
100-41-4	Ethylbenzene	0.50	U
----------	p/m-Xylene	1.0	U
95-47-6	o-Xylene	0.63	

Inchcape Testing Services
Environmental Laboratories

55 South Park Drive
Colchester, VT 05446
Tel. 802-655-1203
Fax. 802-655-1248

The following Qualifiers may be used when reporting any Organic Parameters analyzed by Gas Chromatography (GC) or High Pressure Liquid Chromatography (HPLC). Any additional qualifiers used in the reports will be described in the case narrative. These flags are based on the EPA Contract Laboratory Program statement of work.

GC/HPLC Qualifiers

U - Indicates compound was analyzed for but not detected above the reporting limit.

J - Indicates an estimated value. This flag is used when the result is less than the reporting limit, but ≥ 1/2 reporting limit.

P - This flag is used for a pesticide/Aroclor target analyte when there is greater than 25.0% difference for detected concentrations between the two analytical columns. The lower of the two values is reported on the Form I and flagged with a "P".

C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.

B - This flag is used when the analyte is found in the associated method blank as well as in the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action. Only the samples get a "B" flag. The method blank does not.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor. This flag alerts data users that any discrepancies between the concentrations reported for the dilutions may be due to dilution of the sample or extract. It additionally indicates that spike recoveries may have been diluted below quantifiable levels.

E - This flag identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis. If one or more compounds have a response greater than the upper level of calibration range, the extract shall be diluted and re-analyzed.

X,Y,Z -Laboratory defined flags. These flags must be fully described, and such description attached to the Sample Data Summary Package and the case Narrative. Begin by using "X" and go on to "Y" and "Z" as necessary. These flags may also be used to combine several flags, as needed.

ITS Environmental
Laboratories

55 South Park Drive
Colchester, VT 05446

Analytical Report

Aquaterra
39 Pinnacle Drive
So. Burlington, VT 05403

Attention : Roland Luxenberg

Date : 12/26/96
ETR Number : 62968
Project No.: 96000
No. Samples: 8
Arrived : 12/09/96

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater.
All results are in mg/l unless otherwise noted.

Lab No./ Method No.	Sample Description/ Parameter	Result
320814	1:12/08/96 @1235(Water)	
418.1	Petroleum Hydrocarbons	2.7
8020	Aromatic Volatiles	C
320815	3:12/08/96 @1225(Water)	
418.1	Petroleum Hydrocarbons	7.9
8020	Aromatic Volatiles	C
320816	4:12/08/96 @1140(Water)	
418.1	Petroleum Hydrocarbons	3.0
8020	Aromatic Volatiles	C
320817	5:12/08/96 @1125(Water)	
418.1	Petroleum Hydrocarbons	<0.51
8020	Aromatic Volatiles	C
320818	6:12/08/96 @1115(Water)	
418.1	Petroleum Hydrocarbons	1.2
8020	Aromatic Volatiles	C
320819	7:12/08/96 @1100(Water)	
418.1	Petroleum Hydrocarbons	0.93
8020	Aromatic Volatiles	C

Comments/Notes

C = Procedure/analysis completed

< Cont. Next Page >

ITS Environmental
Laboratories

55 South Park Drive
Colchester, VT 05446

Analytical Report

Aquaterra
39 Pinnacle Drive
So. Burlington, VT 05403

Attention : Roland Luxenberg

Date : 12/26/96
ETR Number : 62968
Project No.: 96000
No. Samples: 8
Arrived : 12/09/96

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater.
All results are in mg/l unless otherwise noted.

Lab No./ Method No.	Sample Description/ Parameter	Result
320820	8:12/08/96 @1050(Water)	
418.1	Petroleum Hydrocarbons	0.74
8020	Aromatic Volatiles	C
320821	Outlet:12/08/96 @1250(Water)	
418.1	Petroleum Hydrocarbons	<0.42
8020	Aromatic Volatiles	C

Comments/Notes

C = Procedure/analysis completed

< Last Page > Submitted By : Karen R. Chiapi Aquatec Inc.

ITS Environmental
Laboratories

55 South Park Drive
Colchester, VT 05446

Analytical Report

Date: 26 December 1996
Inchcape Lab No.: 320814
ETR NO.: 62968
Sample Received On: 12/09/96 Analyzed On: 12/17/96
Sample Identification: Aquaterra, water sample labeled 1, 12/08/96 at 1235 hours.

Volatile Organic Compounds in ug/L
EPA Method 8020 BTEX

benzene	5.0 U
toluene	330
ethylbenzene	5.0 U
m/p xylene	6.2
o xylene	5.0 U

The sample was diluted 10 fold for analysis.

Key to the letters used to qualify the results of the analysis:

U - The compound was analyzed for but not detected at or above the method specified reporting limit.

ITS Environmental
Laboratories

55 South Park Drive
Colchester, VT 05446

Analytical Report

Date: 26 December 1996
Inchcape Lab No.: 320814
ETR NO.: 62968
Sample Received On: 12/09/96 Analyzed On: 12/17/96
Sample Identification: Aquaterra, water sample labeled 1, 12/08/96 at 1235 hours.

Volatile Organic Compounds in ug/L
EPA Method 8020 BTEX

benzene	5.0 U
toluene	330
ethylbenzene	5.0 U
m/p xylene	6.2
o xylene	5.0 U

The sample was diluted 10 fold for analysis.

Key to the letters used to qualify the results of the analysis:

U - The compound was analyzed for but not detected at or above the method specified reporting limit.

ITS Environmental
Laboratories

55 South Park Drive
Colchester, VT 05446

Analytical Report

Date: 26 December 1996
Inchcape Lab No.: 320815
ETR NO.: 62968
Sample Received On: 12/09/96 Analyzed On: 12/17/96
Sample Identification: Aquaterra, water sample labeled 3, 12/08/96 at 1225 hours.

Volatile Organic Compounds in ug/L
EPA Method 8020 BTEX

benzene	9.4
toluene	1.7
ethylbenzene	5.9
m/p xylene	50
o xylene	27

The sample was diluted 2 fold for analysis.

Key to the letters used to qualify the results of the analysis:

U - The compound was analyzed for but not detected at or above the method specified reporting limit.

ITS Environmental
Laboratories

55 South Park Drive
Colchester, VT 05446

Analytical Report

Date: 26 December 1996
Inchcape Lab No.: 320816
ETR NO.: 62968
Sample Received On: 12/09/96 Analyzed On: 12/17/96
Sample Identification: Aquaterra, water sample labeled 4, 12/08/96 at 1140 hours.

Volatile Organic Compounds in ug/L
EPA Method 8020 BTEX

benzene	0.5 U
toluene	1.2
ethylbenzene	0.5 U
m/p xylene	0.5 U
o xylene	0.5 U

Key to the letters used to qualify the results of the analysis:

U - The compound was analyzed for but not detected at or above the method specified reporting limit.

ITS Environmental
Laboratories

55 South Park Drive
Colchester, VT 05446

Analytical Report

Date: 26 December 1996
Inchcape Lab No.: 320817
ETR NO.: 62968
Sample Received On: 12/09/96 Analyzed On: 12/17/96
Sample Identification: Aquaterra, water sample labeled 5, 12/08/96 at 1125 hours.

Volatile Organic Compounds in ug/L
EPA Method 8020 BTEX

benzene	0.5 U
toluene	2.3
ethylbenzene	0.5 U
m/p xylene	0.5 U
o xylene	1.1

Key to the letters used to qualify the results of the analysis:

U - The compound was analyzed for but not detected at or above the method specified reporting limit.

ITS Environmental
Laboratories

55 South Park Drive
Colchester, VT 05446

Analytical Report

Date: 26 December 1996
Inchcape Lab No.: 320818
ETR NO.: 62968
Sample Received On: 12/09/96 Analyzed On: 12/17/96
Sample Identification: Aquaterra, water sample labeled 6, 12/08/96 at 1115 hours.

Volatile Organic Compounds in ug/L
EPA Method 8020 BTEX

benzene	0.5 U
toluene	2.7
ethylbenzene	0.5 U
m/p xylene	0.5 U
o xylene	0.5 U

Key to the letters used to qualify the results of the analysis:

U - The compound was analyzed for but not detected at or above the method specified reporting limit.

ITS Environmental
Laboratories

55 South Park Drive
Colchester, VT 05446

Analytical Report

Date: 26 December 1996
Inchcape Lab No.: 320819
ETR NO.: 62968
Sample Received On: 12/09/96 Analyzed On: 12/17/96
Sample Identification: Aquaterra, water sample labeled 7, 12/08/96 at 1100 hours.

Volatile Organic Compounds in ug/L
EPA Method 8020 BTEX

benzene	0.5 U
toluene	14
ethylbenzene	0.5 U
m/p xylene	0.5 U
o xylene	0.5 U

Key to the letters used to qualify the results of the analysis:

U - The compound was analyzed for but not detected at or above the method specified reporting limit.

ITS Environmental
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Analytical Report

Date: 26 December 1996
Inchcape Lab No.: 320820
ETR NO.: 62968
Sample Received On: 12/09/96 Analyzed On: 12/17/96
Sample Identification: Aquaterra, water sample labeled 8, 12/08/96 at 1050 hours.

Volatile Organic Compounds in ug/L
EPA Method 8020 BTEX

benzene	0.5 U
toluene	12
ethylbenzene	0.5 U
m/p xylene	0.5 U
o xylene	0.5 U

Key to the letters used to qualify the results of the analysis:

U - The compound was analyzed for but not detected at or above the method specified reporting limit.

ITS Environmental
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Analytical Report

Date: 26 December 1996
Inchcape Lab No.: 320821
ETR NO.: 62968
Sample Received On: 12/09/96 Analyzed On: 12/17/96
Sample Identification: Aquaterra, water sample labeled Outlet, 12/08/96 at 1050 hours.

Volatile Organic Compounds in ug/L
EPA Method 8020 BTEX

benzene	0.5 U
toluene	0.5 U
ethylbenzene	0.5 U
m/p xylene	0.5 U
o xylene	0.5 U

Key to the letters used to qualify the results of the analysis:

U - The compound was analyzed for but not detected at or above the method specified reporting limit.

Inchcape Testing Services
Environmental Laboratories

55 South Park Drive
Colchester, VT 05446

75 Green Mountain Drive
South Burlington, VT 05403

Analytical Report

Date: 13 September 1996
Inchcape Lab No.: 312113
ETR No.: 61072 Project No.: 96064
Sample Received On: 09/05/96 Analyzed On: 09/05/96
Sample Identification: Middlebury College, water sample labeled Stream Up 09/04/96 at 1405 hours.

Volatile Organic Compounds in ug/L
EPA Method 8020

benzene	0.5 U
ethylbenzene	0.5 U
toluene	0.5 U
m & p-xylenes	0.5 U
o-xylene	0.5 U
styrene	0.5 U
chlorobenzene	0.5 U
1,2-dichlorobenzene	0.5 U
1,3-dichlorobenzene	0.5 U
1,4-dichlorobenzene	0.5 U

Key to letter used to qualify the results of the analysis:

U - The compound was analyzed for but not detected at or above the reported limit.
The number is the method specified reported limit for the compound.

Inchcape Testing Services
Environmental Laboratories

55 South Park Drive
Colchester, VT 05446

75 Green Mountain Drive
South Burlington, VT 05403

Analytical Report

Date: 13 September 1996
Inchcape Lab No.: 312114
ETR No.: 61072 Project No.: 96064
Sample Received On: 09/05/96 Analyzed On: 09/05/96
Sample Identification: Middlebury College, water sample labeled Stream Down 09/04/96 at 1410 hours.

Volatile Organic Compounds in ug/L
EPA Method 8020

benzene	0.5 U
ethylbenzene	0.5 U
toluene	0.5 U
m & p-xylenes	0.5 U
o-xylene	0.5 U
styrene	0.5 U
chlorobenzene	0.5 U
1,2-dichlorobenzene	0.5 U
1,3-dichlorobenzene	0.5 U
1,4-dichlorobenzene	0.5 U

Key to letter used to qualify the results of the analysis:

U - The compound was analyzed for but not detected at or above the reported limit.
The number is the method specified reported limit for the compound.